THE CAUSAL RELATIONSHIP BETWEEN STOCK PRICES AND THE DEMAND FOR MONEY IN SAUDI ARABIA

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ABSTRACT

The aim of the research is to test the causal relationship between stock prices and the demand for money in Saudi Arabia during (1985-2019). The ARDL method was used to test the existence of a relationship between variables in the long run, in addition to testing the existence of causality between variables using Granger causality. The results showed a positive relationship between stock prices and the demand for money in Saudi Arabia. Granger's causality showed that there is no causality between stock prices and the demand for money in both directions. This result differs from previous studies due to the difference in data and measures used. The results emphasized the importance of not ignoring this variable when estimating the demand for money function because it will lead to biased results. The researcher recommends conducting a study for the same variables used in this research using other scales.

KEYWORDS: Stock, Demand for Money, ARDL & Granger Causality

Original Article

1. INTRODUCTION

The money demand function has been of great importance in scientific research and monetary economics literature during the past two decades. They all revolve around the possibility of identifying the most important determinants that affect the demand for money and examining the extent of the stability of the function in the long term to achieve monetary balance and then achieve sustainable economic growth. The stability of the demand for money is crucial to achieving the efficiency of monetary policy. Therefore, we find many economic researchers have discussed the most important factors that affect the demand for money, including real income, interest rate, exchange rate, inflation, stock prices, ...etc. In addition to many variables that affect the function of demand for money and make it stable during a period for a particular economy. We also note the multiplicity of studies that dealt with the subject, which varied due to the large number of theories explaining the function of demand for money, old and new. It cannot be certain that these studies have reached the end of the matter because the function of demand for money has a complex behavior that varies from one society to another and from time to time, affected by the degree of Technological advances, the ability of banks to introduce financial innovations, and the level of economic openness of the country. This makes studying the behavior of the demand for money available to many researchers and those interested in economic affairs. In the Kingdom of Saudi Arabia, monetary policy in the past played a secondary role, coinciding with the stabilization of the exchange rate in dollars in 1976, the absence of speculation in the money market, and the disappearance of exchange rate risks. Which was then considered a haven

for a stable monetary policy, while relying on fiscal policy as a tool for macroeconomic management. The local government spending variable was used as the main variable to absorb any effect resulting from the money supply, but this tool was not feasible in achieving monetary policy goals, as happened in the seventies of the last century when inflation rates rose dramatically. Its role declined further after the drop in oil prices in 1984 when the search began in earnest for an effective monetary policy to preserve private capital flowing abroad and to control domestic liquidity (Saudi Arabian Monetary Agency, 2008). Over time, the Saudi economy started to turn into a more open economy that does not depend much on regulation and in which the private sector plays a major role in economic and social development. This led to a change in the management of monetary policy, which is part of the general framework that governs the Saudi economy as a whole. Monetary policy strategies, tools and target variables in the Kingdom have changed over time, coinciding with the implementation of economic reform programs imposed by the necessity of the Kingdom joining the World Trade Organization (GATT) in 2005. These reforms led to financial liberalization and expansion, and this was reflected in the function of demand for money and its stability, and thus the impact of this on the effectiveness of monetary policy and its tools, which creates the need for such a study. In light of the orientation of many countries towards the flexible exchange rate system, the globalization of capital markets, and the increasing financial innovations that are developing with the development of modern technologies. All of this created challenges for the monetary authorities in the Kingdom in extrapolating the impact of monetary policy used on the demand for money. For example, there are many opinions in the monetary literature about the degree to which the demand for money is affected by changes in the interest rate. The monetarists see the limited influence of this variable on the rate of interest, while Keynes sees an effective effect of the interest rate on the demand for money. The importance of this dispute arises from its impact on the relative effectiveness of monetary policy in influencing economic activity. From here, the research problem arose in addressing an important part represented by examining the causal relationship between stock prices in the Saudi stock exchange and local liquidity (demand for money) in the Kingdom. This research is a scientific contribution added to the balance of monetary literature that examined the problem of the impact of monetary policy on the function of demand for money and its stability. To ensure an effective monetary policy, as it is considered an important information tool on which central banks rely in making their decisions related to monetary policy. To avoid the occurrence of failures in the function of demand for money in the short term, especially in light of the challenges and developments witnessed by the developing monetary economies, including the Kingdom. These challenges call for a shift towards a flexible exchange rate system to achieve more speculation and thus increase the wheel of economic growth.

2. LITERATURE REVIEW

The topic of demand for money has been of great importance in the economic literature, where studies have dealt with many explanatory theories and determinants of demand for money, particularly the traditional quantity theory of the classics, the Keynesian theory and the modern quantity theory of Friedman. Variousstudies examined the causal relationship between the function of demand for money and stock prices, using different measurement methods. This study focused on the literature that used modern standard methods such as Granger causation, the co-integration method, and the error correction model.Godfrey (2021) deals with the relationship between money supply and stock prices in Nigeria, using the co-integration test and error correction model. The results showed a long-term relationship between the two variables, and the error correction model showed that the money supply (m2) has a significant relationship with the market value of the Nigerian Stock Exchange. Granger's causality showed a two-way causal relationship.Al Rasasi et.al(2020) aimed to test stock prices as one of the determinants of the money demand function along with income and interest rate in Saudi Arabia,

using quarterly data during (2010-2018). The results indicated that there is a positive relationship between stock prices and the demand for money in the long run. The long-term equilibrium relationship can be reached within two quarters. Shawtari (2016) aimed to investigate the causal relationship between the stock market index in South Africa and macroeconomic variables (industrial production, money supply, inflation, exchange rates) using the autoregressive vector (VAR) and the test of co-integration and the error correction vector (VECM) during (1998-2010). The study found a long-term relationship between the previous macro variables and stock prices. The paper also emphasized the need to take into consideration the impact of these variables on the stock market when formulating economic policies. Al-Yousef (2014) estimated the broad money demand function (M2) in Saudi Arabia using the autoregressive distributed lags model (ARDL), based on quarterly data during (1996-2012). The study focused on the impact of the stock market and financial innovations in determining the demand function on the money. The results showed a stable long-term relationship between the amount of domestic liquidity (M2) and its determinants: real income, interest rates, financial innovations, and stock prices. The results confirmed the existence of a significant impact of these variables on the demand for money in the long and short term, except for stock prices. However, omitting it will lead to a wrong determination of the function of demand for money. Adela (2014) investigated the long-term relationship between oil prices, money supply and inflation and stock prices in the Dubai Financial Market, using monthly data from January 2010 to December 2013. The results indicated that there is an inverse relationship between oil prices and stock prices. The Granger causality test indicates that there is causality from oil prices to stock prices, and from money supply to inflation. The results also showed that there is no effect of inflation on stock prices in the Dubai Financial Market, which requires more standard studies to examine the relationship. Affan (2014) deals with the determinants and stability of the money demand function in developing countries within the framework of an open economy in Egypt, using co-integration, error correction model, and stability tests for estimated parameters (Cusum, Cusum SQ) during (1980-2012). The study concluded that the function of demand for money in Egypt is integrated with its determinants and is stable, namely: permanent income, interest rate, inflation rate, exchange rate, foreign interest rate, and stock market index. There is also the possibility of relying on the target money supply to achieve price stability. Kumari (2011) aimed to study the causal relationship between stock prices and exchange rates and the demand for money, using Johansen and Juselius co-integration (1990) and the error correction vector (VECM). The study used monthly data from 1/1996 to 8/2010. The results of Granger's causality test showed that there is a one-way causality of stock prices and exchange rate for the money demand function. The results of the co-integration and the error correction vector also showed the sensitivity of money demand in the long run to changes in inflation, stock prices, interest rates, and economic activity.

3. DATA AND METHODOLOGY

The research aims to test the causal relationship between stock prices and the demand for money in the Kingdom within the framework of the money demand function, which includes the gross domestic product (GDP) and market interest rate (R). Annual data was used during (1985-2019) that was determined to coincide with the establishment of the Saudi stock market in 1985, as it was obtained from the annual reports of the Saudi Arabian Monetary Authority, the Saudi General Authority for Statistics and the World Bank database (WDI). The data includes the demand for money in the broad sense of M2 in the Kingdom, which includes (currencies circulating outside banks and demand deposits M1, in addition to time deposits, short-term savings deposits, and savings deposits). Gross domestic product at current prices, market interest rates in Saudi banks (SIBOR), and stock prices as measured by the Saudi stock exchange index. According to economic theory, there is a positive relationship between GDP and demand for money, and an inverse relationship between interest rate and

demand for money. The relationship between stock prices and the demand for money is theoretically determined according to two approaches, the Keynesian approach: He sees that the mechanism of transmission of influence is achieved directly, as an increase in the money supply may lead to an increase in stock prices. Friedman's monetary approach: He believes that the effect is achieved by comparing the relative returns of the assets that make up the investment portfolio. In general, the value of shares may affect the demand for money in a positive or negative relationship, and it may not affect the demand for money. This depends on the impact of income and substitution on cash balances, and the negative substitution effect may be because the rise in stock prices may increase the attractiveness of speculation in stocks, leading to a decrease in the demand for money. The effect of substitution may be positive, indicating that the effect of wealth dominates over the alternative effect. Friedman points out that the level of stock prices represents the wealth obtained by the stock owner. Therefore, in the short term, the value of the shares enters the equation for money demand as an expression of the opportunity cost, while in the long run it is considered a store of value (Al-Yousef, 2014).

Within the framework of the different measurement methodologies that depend on the nature of the data used and the formulation of the standard model, the Autoregressive Time Distributed Delays (ARDL) methodology was used to test the existence of a long-term relationship, and then estimate the Error Correction Model (ECM). After conducting the necessary tests to study the behavior of variables using unit root tests, Granger causality will be used to find out the mutual effect between the variables. All this after making sure that the model is free from standard problems such as heteroskedasicity, autocorrelation, and multicollinearity. The target function takes the following form:

$$M/_P = f(y_t, r_t, sp_t)$$

Where M: money supply, P: price index, R: bank interest rate, SP: stock prices. After writing the equation in the long run and taking the logarithm of the variables, the equation becomes:

$$\ln M2 = \alpha + \beta_1 ln y_t + \beta_2 r_t + \beta_3 \ln sp_t + \varepsilon_t$$

We note that by using the logarithm of the variables, the values of the coefficients will give the elasticities directly to the variables that have special significance in the money demand function. The logarithm of all variables except the interest rate variable was taken in line with the previous literature.

4. RESULT AND DISCUSSIONS

4.1. Stability Test

Before starting the application of the bound test methodology for co-integration, it is necessary to identify the characteristics of the study variables in terms of stability, using **the Unit Root test.**

Table 1: Results of Stability Tests using ADF

Variable	At Level			At 1st Deference		
	Trend and Intercept	**Intercept**	**non**	**Trend and Intercept**	**Intercept**	**non**
LM2	-1.61	2.78	2.85	-3.91	-3.28	-0.99
LGDP	-2.51	0.08	2.9	-4.4	-4.67	-3.61
R	-4.64	-1.75	-1.78	-4.11	-4.71	-3.55
LSP	-2.36	-1.37	1.04	-6.42	-6.45	-6.13

							%10	%5	%1	
						1	-1.61	-1.95	-2.58	
						2	-2.57	-2.86	-3.43	
						3	-3.12	-3.41	-3.96	
					Source: MacKinnon (1996)					
Critical values to test of ADF										

The results of unit root tests using ADF showed that the variables are not static at the level and static at the first difference. This means that the variables are integrated at first degree I (1), therefore there may be at least one long-term relationship between the variables, according to Granger and Johansen.

4.2. Bound Test

To test the existence of a long-term relationship between variables using the ARDL co-integration model based on Wald's test, the number of lags was determined using the Akaike info criterion, and the results were as in Table 2.

Table 2: Co-Integration Test Results "non-Trend Orintercept"

Regressions	lags	Sta.F	)t ,(ECM_{T-1}	Result
M2,GDP,R,SP	(1,0,3,0)	28.93	-0.171 (-2.95)	Co-integration
GDP,M2,R,SP	(4,4,4,4)	4.19	-0.972 (-3.10)	Co-integration
R,M2,GDP,SP	(4,4,4,4)	9.43	-1.231 (-4.56)	Co-integration
SP,M2,GDP,R	(3,4,4,0)	6.81	-1.118 (-4.17)	Co-integration
I(1)I(0)				
%5 4.917 3.7806 Pesaran et al, (2001)				

The results indicate through the F-statistic that there is a long-term relationship in the four regressions, which indicates that there is a co-integration of the model to be tested. After confirming the existence of co-integration, the long-term relationship of the study model can be estimated, in which M2 represents the dependent variable. This relationship was estimated using the natural logarithm, which gives the elasticities of demand for the study variables during the research period (1985-2019) according to the following equation:

$$lnM_2 = \propto + \beta_1 lnGDP + \beta_2 R + \beta_3 lnSP + \in_t$$

4.3. Regression Analysis

The following results represent the results of estimating the long-term relationship of the M2 regression using the ARDL (1,0,3,0) model.

Table 3: Results of a Long-Term Relationship

Variable	Coefficients	Sta.T	Std. Error
LNGDP	0.857	9.65	0.088
R	-0.081	-3.36	0.024
LNSP	0.233	1.46	0.159

There is a positive significant relationship between GDP and the demand for money, where the income elasticity is equal to 0.857, which indicates that the demand for money M2 changes by 0.857% for each 1% change in GDP in the same direction. This percentage is less than the income elasticity obtained in the study of Al-Youssef (2014), as it amounted to 1.487, which indicates the presence of other factors that led to this decline, for example, the decline in oil

revenues in the Kingdom to low levels that they did not reach before during the period (2010-now). Thus, the decrease in liquidity may have an impact on the income elasticity of demand for money, and its decrease to 0.857 is reflected on the economy, as the impact of fiscal and monetary policies on the real economy depends on the elasticities of demand for money. The difference in elasticity may be due to the sensitivity of the elasticities to the change in the type of data used - annual, quarterly, ..., the type of variables included in the study, and the number of delays selected in the model.The results also indicate that there is a negative and significant relationship between the interest rate and the demand for money. Where the interest rate factor was -0.081, which is higher than the interest rate factor in the study of Al-Yousef (2014), which is equal to -0.03, this rise indicates an increase in the demand for bank deposits during the research period despite the presence of religious reservations towards the interest rate in Saudi society. As for the relationship of stock prices with the demand for money, it was positive and insignificant, which is an unexpected result, despite the theory's recognition of the existence of the relationship, and the confirmation of some recent studies conducted in the Kingdom on this relationship. Including the study of Al-Batel (2005), which concluded that there is a significant relationship between stock prices and the demand for money, as the rise in stock prices may affect the possibility of converting this money into financial instruments that have a return, thus reducing the demand for money. Being positive may justify this by increasing the actual participation of the private sector in trading, especially after the drop in global oil prices and consequently the decline in the returns of its shares, as well as allowing foreign investors recently to enter the Saudi stock market through Equity Swap Contract with a certain ceiling.

4.4. Error Correction Model (ECM)

At this stage, the estimated residuals in the long-run relationship are used to estimate the error correction coefficient(ECM_{T-1}), using a model that includes the least number of lags, which are currently (0,0,2,0). This is done after making sure that the model is free of measurement problems.

Table 4: Error Correction Model with Model Examination Tests

Variable	Coefficients	Sta. T	Std. Error
DLGDP	0.147	2.45	0.059
DR	-0.012	-1.46	0.008
DR(-1)	-0.011	-0.81	0.013
DR(-2)	0.018	2.36	0.007
DLSP	0.04	1.98	0.020
ECM_{T-1}	-0.171	-2.95	0.057
$R^2 = 0.99 \text{Durbinh} = 0.64$			
$LM = LMx_2^2 = 1.44 \text{Normality} JB = 0.714$			
$Ramsyx_1^2 = 2.230 \text{Heteroskedasocity} x_1^2 = 0.292$			

The model checking tests in Table 4 indicate that the model is free from standard problems, the most important of which are autocorrelation and heteroskedasicity. the structure of the model is appropriate according to the Ramsy test. The results also indicate that the error correction coefficient(ECM_{T-1}) satisfies the conditions indicating a correct co-integration relationship, as we find it a negative and significant value. The error correction coefficient shows the speed of the adjustment from the short-term relationship to the long-term relationship, where its value is -0.171, meaning that the distance from the equilibrium is corrected about 17.1% of it every year, and since the data is annual, the correction process needs about 6 years to reach the long-term relationship the long.

4.4. Granger Causality Test

Finally, to test the existence of causation between stock prices and the demand for money, we conduct the Granger test for causality, by performing the necessary regressions that test the null hypothesis (H_0) which says that there is no causality between the two variables. The following table shows the test results.

Table 5: Granger Causality Test-lags (2)

Regression	F (prob)	Result
M_2/SP	0.019 (0.98)	no causality
SP/M_2	1.69 (0.16)	no causality

It is clear from the results that there is no causality in both directions between stock prices and the demand for money in Saudi Arabia. It is an unexpected result, as the theory acknowledged the existence of the relationship between them, and this was confirmed by some standard studies in the Kingdom, including the study of Al-Batel (2005), and this is justified by the same reasons that were mentioned previously when analyzing the long-term relationship.

5. CONCLUSIONS

The research aims to study the causal relationship between the demand for money and stock prices in the Kingdom of Saudi Arabia during (1985-2019), using the (ARDL) method of co-integration, and Granger causality. In light of the critical theory and previous literature, which served as the guide and controller for the research path to the end, and the statistical treatment of the research data using the Eviews9 program was relied upon. The research found that stock prices have a positive relationship with the demand for money in the Kingdom, which reflects the recovery of the financial market, and the increase in demand for it from the private sector in recent years after the shock to the Saudi stock market and the heavy losses of investors in 2006. Granger's causality also showed that there is no causality between stock prices and the demand for money in both directions, despite the significance of the relationship in the short term and the stability of the time series. On the other side of the study, the study showed a significant and positive relationship between the demand for money and GDP with relatively low flexibility, which indicates the weak effectiveness of monetary policy in the Kingdom in influencing the real variables in the economy under the fixed exchange rate system. The results also showed that the demand for money was inversely affected by the interest rate, which is a significant relationship and a higher coefficient than previous studies, which indicates an increase in the demand for bank deposits in the Kingdom. In light of the previous results, the researcher believes that despite the insignificance of the relationship between stock prices and the demand for money, it is important not to neglect stock prices when estimating the function of demand for money, because its omission will lead to biased and inconsistent results, making the prediction of the long-term relationship questionable. Accordingly, the research recommends conducting studies of the relationship between stock prices and the demand for money using other, more accurate and detailed measures, such as using real stock prices for a sample of companies listed in the financial market, so that they are sufficient to represent all sectors in the market.

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